Gageby – Report of Tire Examination

I was asked to examine a Dunlop D402 Harley Davidson, serial # DATR M17M 1305, rear motor cycle tire (subject tire), and to determine the cause of its failure. My observations and opinions are outlined in the following report. All of these opinions are based on my education, experience, training, skills, knowledge, and a review of the items and documents in this case. All of my opinions are based on a reasonable degree of scientific and engineering certainty.

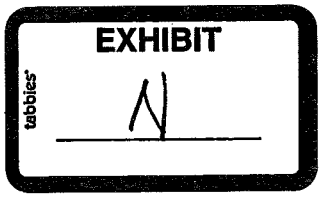
Background

On 05/08/2007, Mr. Stephen Gageby was operating a 2003 Harley Davidson motorcycle, MT 1-5588, VIN 1HD1FCW103Y631209on westbound Interstate 90, near milepost 116, in the state of Montana. Karla Gageby was riding as a passenger. Suddenly, the rear tire catastrophically failed, causing the operator to lose control of the motorcycle and crash. The crash resulted in fatal injuries to the operator, and serious injuries to the rider.

Items Reviewed or Examined

- Dunlop D402 Harley Davidson, serial # DATR M17M 1305 (rear, subject tire), dismounted
- T16X3.00 DOT castalloy wheel, with drive and brake attachments (subject wheel)
- Deposition of Karla Gageby
- Deposition Transcript of Rick South
- Deposition Transcript of Denny Morgan
- Deposition Transcript of Chad St. John
- Deposition Transcript of Jace Dickens
- Deposition Transcript of Jason Hildenstab
- Deposition Transcript of Jerry Mulalley
- Deposition Transcript of Susan Galarneau
- Deposition Transcript of Joe Odell
- Deposition Transcript of Derek Andrews
- Deposition Transcript of Jason Johns
- Montana Highway Patrol Fatal Crash Report # 0700015480502
- Numerous Photos taken at the Crash Scene
- Memorandum and Confidentiality Protective Order

In addition, numerous documents, exhibit items and references have been submitted to me as listed at the end of this report.



GAGEBY 8872
PE 000387

Gageby – Report of Tire Examination

Conclusions

With a reasonable degree of engineering certainty, and subject to change if additional information is obtained, including the responses owed by the manufacturer to the discovery requests, it is my professional opinion that:

1. The failure mode in the tire was a run-soft failure, resultant from extreme and abnormal over-deflection of the tire, while running at its normal operating load and normal highway speeds.
2. The tire failed prematurely as a result of intense heat at the folding and hinge points on the tire from the over-deflection. Temperatures in these regions of the tire reached the melting point of the polyester carcass ply cords. As these cords melted and/or fatigued, the surrounding rubber reverted and burned. This also led to massive ply separations under the SS shoulder.
3. The tire became abnormally over-deflected from a slow loss of inflation pressure, much of which occurred over a period of 10-30 minutes while running, prior to the accident.
4. This air pressure loss resulted from leaks between the tire bead and the rim flange.
5. Toe ring flash near the OSS bead heel of the subject tire produced a leak.
6. This flash is a manufacturing defect.
7. A partially separated chafer in the SS bead heel region of the subject tire produced a leak, as well as intra carcass pressurization.
8. This separated chafer is a manufacturing defect.
9. Such manufacturing defects in a finished tire are readily and immediately visible upon visual inspection at the tire factory.
10. Routine disposition for a tire in the condition of the subject tire would be to scrap the product.
11. There was significant tread life remaining on the tire.
12. With a serial (DOT) number indicating that the tire was manufactured in the 13th week of 2005, the tire was not too old, notwithstanding the deterioration of the air seal compensation provided for the above-mentioned defects.
13. No other source of air pressure loss was found in the subject tire.
14. The subject wheel had satisfactory rim flanges for air retention, prior to the tire failure..
15. The subject valve was performing satisfactorily for air retention.
16. The liner is blistered, split, torn, and reverted in the regions of extreme heat from the over-deflection.

Gageby – Report of Tire Examination

17. When a tire is new, the potential exists for the rubber to be soft enough to overcome these defects and produce an adequate air seal. However, as the tire ages and the rubber hardens, it becomes less capable of enveloping these disruptions in the air seal, and the leakage increases. In addition, the hot running temperatures in a tire, together with warm ambient temperatures, accelerate this aging and hardening process of the rubber.
18. The increased leakage associated with the hardening of the rubber is not necessarily linear with time. Rather, it can experience a "stick/slip" phenomenon, wherein the air loss rate is suddenly increased. This sudden deterioration in the air seal can be further exacerbated when the tire is loaded and running. The very small, normal movements of the tire bead in the rim flange can eventually lead to the sudden inability of the tire bead rubber to overcome these defects. Likewise, when the motorcycle is parked and only partially loaded, these leaks can be diminished.
19. The above mentioned defects in the subject tire were the cause of the subject tire's failure.

My opinions in this report are subject to modifications or revisions as more information is made available.

Respectfully submitted,

William J. Woehrle

References

[1] *2007 Yearbook of the Tire and Rim Association, Inc.*

[2] *2005 Who Makes it and Where Tire Directory*, a Bennett Garfield Publication

[3] The Pneumatic Tire, Joseph P. Walter, Editor

[4] Mechanics of Pneumatic Tires, Samuel K. Clark, Editor

[5] Brico, Jean-Claude, *Abnormal Wear,* ITEC 2004 Paper 20

[6] Brico, Jean-Claude, *Bead Compression Grooving: Characteristics and Influence of Tire Deflection,* ITEC 2004 Paper 44

[7] Baldwin, John M. *Tire Aging Update*, ITEC Presentation, September 12, 2006